Introduction to SQL

Class 5

Course Overview

- Introduction to SQL
  - Databases, Tables
  - Classification of SQL – DDL, DML, DCL, TCL
    - DDL – CREATE, ALTER, DROP
    - DML – SELECT, INSERT, UPDATE, DELETE
    - DCL – GRANT, REVOKE
    - TCL – COMMIT, ROLLBACK, SAVEPOINT
  - Data types, Operators
  - Keys – Primary, Foreign, Composite, Unique, Alternate
  - Integrity Constraints – Domain Integrity Constrains, Entity Integrity Constraints, Referential Integrity Constraints
  - Joins – Outer Joins, Left Outer Joins, Right Outer Joins, Inner Joins.
  - Queries, Subqueries, Functions, Flow Control (IF, CASE, WHILE, FOR, LOOP), Stored routines
  - Views
  - Concurrency and locking (Implicit locks, explicit locks, row level locks, table level locks, database level locks)
  - Indexes, Cursors, Triggers, Events
  - Tuning SQL queries and optimizing performance
  - SQL Databases vs NoSQL Databases
  - ACID, CAP
  - How SQL databases internally works

CREATE TABLE

- Syntax

```
CREATE TABLE [IF NOT EXISTS] table_name(
    column_definition1,
    column_definition2,
    ........,
    table_constraints
);
```

column_definition	It specifies the name of the column along with data types for each column. The columns in table definition are separated by the comma operator. The syntax of column definition is as follows: **column_name1 data_type(size) [NULL | NOT NULL]**
table_constraints	It specifies the table constraints such as PRIMARY KEY, UNIQUE KEY, FOREIGN KEY, CHECK, etc.

Example

```
CREATE TABLE employee_table(
   id int NOT NULL AUTO_INCREMENT,
   name varchar(45) NOT NULL,
   occupation varchar(35) NOT NULL,
   age int NOT NULL,
   PRIMARY KEY (id)
);
```

Useful table commands

- SHOW tables;
- DESCRIBE table_name;

ALTER TABLE

- The ALTER TABLE statement in MySQL is used to modify the structure of an existing table.
- You can use ALTER TABLE to add, modify, or delete columns in a table, as well as to change the data type, name or other properties of a column.
- You can also use ALTER TABLE to add or drop primary keys, foreign keys, and indexes.
- You can also use ALTER TABLE to rename a table or add/drop/change options to a table.
- ALTER TABLE can also be used to add or drop partitioning for a table.
- ALTER TABLE operations can also be used to modify the storage engine used by the table.
- ALTER TABLE can be used to add or drop columns from a table, but it can be a slow operation for large tables.
- ALTER TABLE operations are processed in a non-atomic way, which means that the table is locked for the duration of the operation.
- ALTER TABLE can be used to change the default value of a column.
- ALTER TABLE can also be used to add or drop check constraints in a table.

RENAME Table

- RENAME old_table TO new_table;
- We can also use ALTER to rename the table
  - **ALTER TABLE** old_table_name RENAME **TO** new_table_name;

DROP table

- It deletes an existing table
- This statement removes the complete data of a table along with the whole structure or definition permanently from the database.
- **DROP TABLE** table_name;
- **DROP TABLE** [IF EXISTS] table_name
- **DROP TABLE** IF EXISTS table_name1, table_name2, **table**, ..., table_ nameN;

Column Level Constraints(Checks)

Column level constraints apply on a single column in a table.

- NOT NULL: ensures that a column cannot contain a NULL value
- UNIQUE: ensures that the values in a column are unique across all rows in the table
- CHECK: allows you to specify a boolean expression that must evaluate to true for a row to be inserted or updated in the table
- DEFAULT: sets a default value for a column if no value is specified when a row is inserted
- PRIMARY KEY : Used to identify each record in a table uniquely
  - A PRIMARY KEY column cannot be null or empty
  - All items in a primary key column are unique
  - There can be only one primary key column in a table

Column Level Constraints(Checks)

- AUTO INCREMENT – Automatically generates a unique number whenever we insert a new record into the table
  - Generally used for PRIMARY KEY field
- ENUM – It is a string object. Allows us to limit the value chosen from a list of permitted values during table creation

You can also give a name to your constraint

```
CREATE TABLE teenagers (
    . . .
    age INT CONSTRAINT is_teenager CHECK (age >= 13 AND age <= 19),
    . . .
);
```

Table Level Constraints(Checks)

We can use more than one column to specify table level constraints

- UNIQUE
- CHECK
- PRIMARY KEY
- FOREIGN KEY – Referencing a column from another table that is a primary key or unique in that table.

PRIMARY KEY

- A primary key is a column or set of columns that uniquely identifies each row in a table.
- It is used to enforce the integrity of the data in a table by ensuring that there are no duplicate values.
- A primary key constraint is used to prevent actions that would create duplicate values in the primary key column.
- It can be implemented on a single column or multiple columns of a table.
- A primary key column cannot contain null values.
- A table can only have one primary key.
- You can use the ALTER TABLE or CREATE TABLE statement to add a primary key to a table.
- The primary key is used to establish relationships between tables in a database through foreign keys.
- You can use the primary key to join multiple tables together in a relational database.
- Primary keys are often used as the index for a table, which can improve the performance of queries that search for specific rows.

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Thank you